

Chapter 1

description of the alternatives

INTRODUCTION

History and Background

The Jackpile-Paguate uranium mine is located on the Laguna Indian Reservation, 40 miles west of Albuquerque, New Mexico (Map 1-1). The mine was operated by Anaconda Minerals Company, a division of the Atlantic Richfield Company. Mining operations were conducted continuously from 1953 through early 1982. The mine was closed because of depressed uranium market conditions, and studies are underway to determine how best to permanently reclaim it.

Mining operations were conducted under three uranium mining leases between Anaconda and the Pueblo of Laguna (Map 1-2). The leases cover approximately 7,868 acres, as shown in Table 1-1 below:

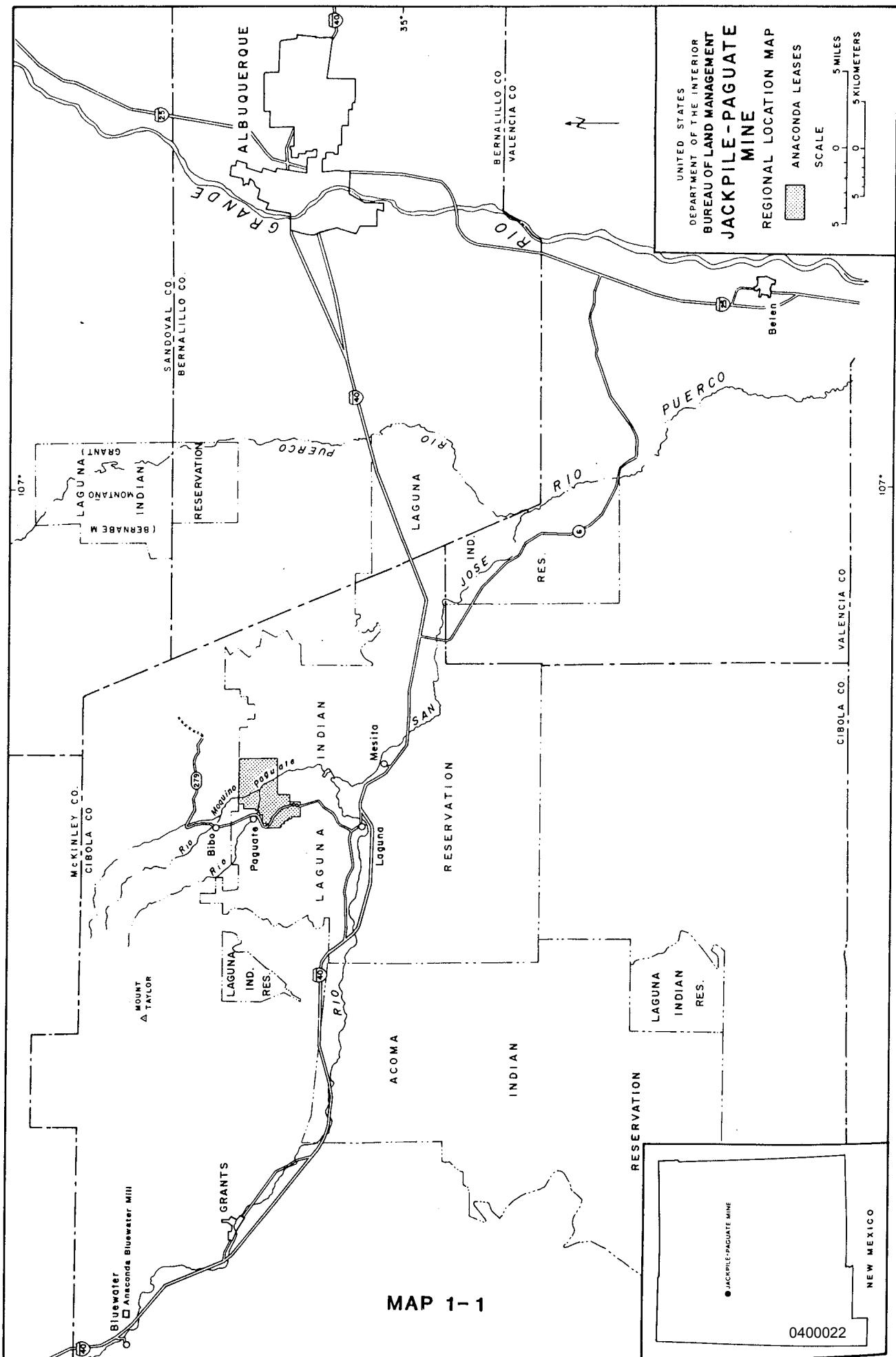
TABLE 1-1
JACKPILE-PAGUATE URANIUM MINE LEASES

Lease Number	Date Signed	Size (Acres)
Jackpile	May 7, 1952	4,988
4	July 24, 1963	2,560
8	July 6, 1976	320
Total		7,868

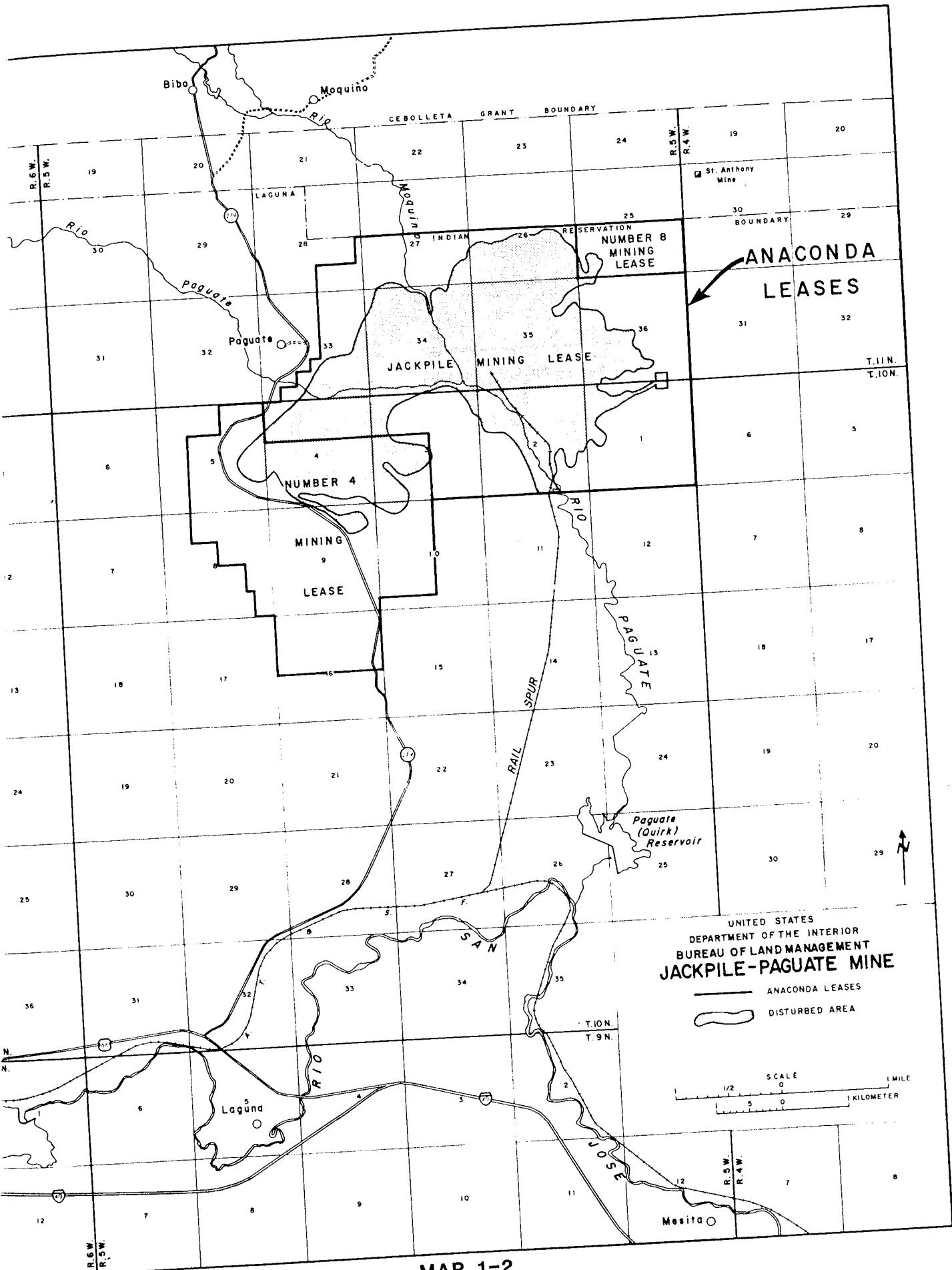
Mining operations were conducted from three open pits and nine underground mines. Open pit mining was conducted predominantly with large front-end loaders and haul trucks. The overburden, consisting of topsoil, alluvium, shale and sandstone was blasted or ripped, removed from the open pits, and placed in waste dumps. The uranium ore was segregated according to grade and stockpiled for shipment to the mill. In the later years of mining, material conducive to plant growth was stockpiled for future reclamation, and some overburden and ore-associated waste was placed in the mined-out areas of the pits as backfill.

Underground mining was conducted by driving adits, or declines, to the ore zone. Drifts were driven through the ore zone, and the ore removed by modified room and pillar methods. Ventilation holes were drilled to maintain a fresh supply of air. Mine water was collected in sumps and pumped to ponds in the open pits. Waste rock was placed in waste dumps, and the ore was stockpiled for shipment to the mill.

During the 29 years of mining, approximately 400 million tons of earth were moved within the mine area, and about 25 million tons of ore were transported from the site via the Santa Fe Railroad to Anaconda's Bluewater Mill, 40 miles west of the mine (Map 1-1).



MAP 1-1



The mining operations resulted in 2,656 acres of surface disturbance as shown in Table 1-2.

TABLE 1-2
SURFACE DISTURBANCE

Features	Acres Disturbed
Open Pits	1,015
Waste Dumps	1,266
Protope Stockpiles	103
Topsoil Stockpiles	32
Support Facilities & Depleted Ore Stockpiles	240
TOTAL:	2,656

Additional acreage (unquantified) was disturbed by the drilling of exploration holes. Visual A, pocketed in the back of this Environmental Impact Statement (EIS), displays the mine complex as it presently exists.

Anaconda ceased all mining operations on March 31, 1982, but continues to provide security at the site to prevent unauthorized entry, and continues to operate an environmental monitoring program.

Anaconda advised the Department of the Interior (DOI) and the Pueblo of Laguna in April 1980 that open pit operations would terminate in February 1981 and subsequently submitted a reclamation plan to the DOI on September 11, 1980. Anaconda submitted a revised plan (Green Book Proposal) on March 16, 1982. On August 19, 1985, Anaconda submitted a preliminary version of a new reclamation plan entitled the 1985 Multiple Use Reclamation Plan for the Jackpile-Paguate Uranium Mine. This plan was submitted in final form on October 4, 1985. Anconda stated that this new plan rendered the 1982 Green Book Plan obsolete and withdrew it from further consideration in the EIS process. The Green Book is being carried forward in the Final EIS but is no longer endorsed by Anaconda.

Anaconda's leases are administered by the Bureau of Indian Affairs (BIA), and the mining and reclamation operations are supervised by the Bureau of Land Management (BLM). Both of these agencies are within DOI.

Purpose and Need for Reclamation

Reclamation of the Jackpile-Paguate uranium mine is necessary because:

1. The site is presently a public health and safety hazard;

2. Additional and more serious hazards would develop if the site is not reclaimed; and

3. The mining lease terms and Federal regulations (25 CFR Parts 211 and 216, and 43 CFR Part 3570) require that reclamation be performed by the leaseholder.

This EIS assesses and compares the environmental impacts of four reclamation alternatives, including proposals developed by Anaconda, the Pueblo of Laguna and the DOI. The proposed action for this EIS is the review and approval of a reclamation plan for the Jackpile-Paguate uranium mine.

The lease terms and regulations require reclamation but do not contain specific goals or standards to guide the DOI's decision. Therefore, the DOI must consider various reclamation alternatives, and choose the one that is considered to be the most appropriate.

Scope of the EIS

The scope of this EIS is 1) the reclamation (restoration to productive use) of the Jackpile-Paguate uranium mine and the affected adjacent areas, and 2) mitigation of impacts resulting from reclamation.

Federal Trust Responsibility

Indian tribes and pueblos enjoy a unique status under Federal law based upon what has been characterized as a "guardian-ward" status. Morton v. Mancari, 417 U.S. 535, 551 (1974); Cherokee Nation v. Georgia, 30 U.S. (5 Pet.), (1831). This is a judicially created fiduciary status that is loosely characterized by saying that the Secretary of the Interior has a "trust responsibility" to the Indians. Chambers, Judicial Enforcement of the Federal Trust Responsibility, 27 Stanford Law Review 1213, 1214 (1975). The trust responsibility arises out of statutes, treaties, executive orders and those situations where the Bureau of Indian Affairs (BIA) holds title to Indian land and administers it "in trust" for particular tribes. United States v. Mitchell, 445 U.S. 535 (1980); Cape Fox Corporation v. United States, No. 664-801 (Ct. Cl. filed December 27, 1983), Chambers, supra. The trust responsibility is a limited one that arises from and is limited by, the authorizing statute, treaty, or executive order, and it varies according to the particular relationship being examined. See North Slope Borough v. Andrus, 642 Fed. 589, 611 (D.C. Cir. 1980).

Due to the governing regulations and the Secretary of the Interior's trust responsibility to Indians (and in this action specifically to the Pueblo of Laguna), the DOI is responsible for determining the proper level of reclamation for the Jackpile-Paguate uranium mine.

Responsibilities

The BLM and BIA share joint responsibility for a decision on approval of a reclamation plan for the Jackpile-Paguate uranium mine. However, each agency has specific responsibilities with regard to reclamation as outlined below.

The BLM is responsible for authorizing the commencement and approving the completion of the Jackpile-Paguate uranium mine reclamation. The authorities for this action are the terms of the mining leases that require compliance with applicable Federal regulations. Specifically, they include the following:

1. 25 CFR Part 211, Leasing of Tribal Lands for Mining (formerly 25 CFR Part 171);
2. 25 CFR Part 216, Surface Exploration, Mining and Reclamation of Lands (formerly 25 CFR Part 177); and
3. 43 CFR Part 3570, Operating Regulations for Exploration, Development and Production (formerly 30 CFR Part 231).

The BLM is also responsible for authorizing any necessary changes in the ongoing reclamation operations and for preparing any corresponding environmental documentation that would be required.

The BIA is responsible for determining that the surface aspects of mine reclamation, including revegetation, have been completed in accordance with the Secretary's trust responsibility as well as established requirements. In conjunction with this determination, the BIA is responsible for authorizing partial or total release of any bonding requirements, and partial or total surrender of the involved mining leases. The authorities for these actions are various terms of the mining leases and the provisions of 25 CFR Parts 211 and 216.

Due to the effective dates of the three mining leases and applicable Federal regulations, disagreement exists between the involved parties about the applicability of some of these regulations to certain leases. Debate has also occurred about the interpretation of various lease terms. It is not intended that this EIS resolve any such disagreement or debate. This section of the EIS merely identifies the Federal regulations that relate to one or more of the mining leases, and indicates that the lease terms and those regulations assign certain responsibilities to the BLM and the BIA.

Interrelationships with Other Projects

The only related project planned is the realignment of State Highway 279 through the mine area. This project is dependent on State legislative appropriation. The realignment is scheduled to take place prior to or during reclamation. This project is not precluded by any of the alternatives addressed in this EIS nor would the realignment preclude implementation of any of the reclamation proposals.

ISSUES AND CONCERNS

During the initial stages of the EIS process, public meetings were held to determine the issues of greatest concern related to the mine reclamation project and possible reclamation measures. This process is called "scoping". The DOI reviewed all the comments raised during these meetings and selected those major issues to be addressed in this EIS. The criteria DOI used for selecting major issues were whether the concerns expressed were substantive, and whether the issues fell within the scope of this EIS as stated on p. 1-5. Issues that failed to meet both criteria were dropped from further evaluation. Issues which met the criteria were used to develop reclamation objectives which in turn would be used to evaluate alternatives. Public input received during the early stages of the scoping process and in subsequent public hearings on the DEIS revealed that the issues of blast damage to Paguate Village during mining operations and possible radiological contamination in Paguate Reservoir were primary concerns raised by the Pueblo of Laguna. However, data compiled to date has been inconclusive on both issues. Therefore, DOI considers these two areas of concern to be unresolved liability issues. A more detailed discussion of scoping activities is contained in Chapter 4 - Consultation and Coordination.

Issues Dropped from Further Evaluation

1. Investigate the possible psychological effects that the mining operations and mine closure had on the Laguna people. Rejected as not within the scope of this EIS.

The present socioeconomic conditions of the Laguna people and the socioeconomic impacts of the reclamation operations are discussed in this document. However, NEPA does not require, and no useful purpose would be served by analyzing the impacts of past mining and mine closure.

2. Investigate the possible health impacts that mining operations had on former miners and residents of Paguate Village. Rejected as not within the scope of this EIS.

The predicted health impacts to the workers performing reclamation and post-reclamation impacts to the Laguna people are discussed in this document. However, NEPA does not require, and no useful purpose would be served by analyzing the impacts of past mining and mine closure.

3. Protection of the remaining on-site uranium resources (protope and unmined deposits) and existing mine workings for future production. Rejected as not within the scope of this EIS.

Projection of economic conditions suitable for recovery of the remaining reserves is speculative. A new mining project is not precluded in any of the reclamation proposals, and it is recognized that the treatment of protope and existing mine workings under various alternatives could significantly affect future mining costs. This is briefly discussed to the extent possible under each alternative.

4. Allow future residential and farming use of the minesite. Rejected as being contrary to the reclamation objective of ensuring human health and safety.

Either of these activities would require disturbing reclaimed areas to a significant degree and therefore have the potential for releasing previously covered radioactive materials into the biosphere.

5. Develop national standards for the reclamation of uranium mines. Rejected as not within the scope of this EIS.

Subtitle C of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, directed the U.S. Environmental Protection Agency to promulgate regulations for the management of hazardous wastes. These regulations were issued, but they exclude mining wastes. Evaluation of this site-specific project does not preclude Congress from acting to designate mining wastes as hazardous materials nor does it prevent DOI from using regulations for other similar activities as guidelines.

Issues Evaluated

1. Radiological doses and health impacts to workers involved in reclamation, persons visiting the minesite, residents of Paguate Village and to the general public.

2. Non-radiological minesite hazards such as possible collapse of the underground entries and workings, collapse of abandoned mine buildings and hazards due to unstable highwalls and waste dumps.

3. Engineering the reclaimed land forms to ensure their long-term integrity and blend the visual characteristics of the minesite with the surrounding landscape.

4. Contamination of surface and ground waters.

5. Revegetation of the minesite to prevent erosion and facilitate post-reclamation land use (i.e., livestock grazing).

6. Backfilling or draining the open pits to prevent ponding of contaminated water.

7. Minimizing the concentration of airborne particulates during and after reclamation.

8. Protection of cultural, religious and archaeological sites within the minesite.

9. Socioeconomic impacts of reclamation on the Pueblo of Laguna.

10. Long-term environmental monitoring needs and procedures.

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

The following is a list of the alternatives eliminated from detailed study, and a brief explanation as to why they were rejected:

1. Return the tailings from Anaconda's Bluewater uranium mill to the minesite. Rejected as not within the scope of this EIS.

The U.S. Nuclear Regulatory Commission has jurisdiction over uranium mill sites in the State of New Mexico. Return of the mill tailings to the minesite has not been included in any of the Company or Tribal proposals and is not provided for by the leases.

2. Construct a wind or solar energy project at the mine or develop the site as an industrial park. Rejected as not within the scope of this EIS.

Such projects are not precluded in any of the alternatives addressed, but developing new industries for the Pueblo of Laguna is an issue separate from reclamation of the minesite.

3. Completely backfill all open pits. Rejected as being not feasible and unnecessary.

The cost of backfilling all pits would exceed \$200 million which is considered to be unreasonable. Also, studies thus far do not support that completely backfilling the pits is necessary.

4. Use the site as a source of gravel. Rejected as not within the scope of this EIS.

The alternatives addressed in this document neither make provisions for, nor preclude this use. Reserves of gravel are present throughout the area, and far exceed the expected demand. Reserves of gravel and fill also exist on the site, but any future development would have to assure that radiological material is not removed or uncovered.

5. Contain all solid wastes and liquids within the lease property. Rejected as technically impractical and inconsistent with the objective of restoring post-reclamation land use.

Managing the reclaimed mine for zero discharge of waste material using conventional control techniques (i.e., lining, capping and hydrodynamic control) would be extremely expensive, provide little environmental benefit over simpler methods and would require permanent maintenance. Such techniques would result in large areas of the mine being unsuitable for any other use.

ALTERNATIVES SELECTED FOR DETAILED STUDY

The scoping process indicated that reclamation of the Jackpile-Paguate uranium mine could be accomplished in several ways due to the interrelationships of various reclamation components (e.g., backfilling and resloping of waste dumps). However, since no specific standards

exist for uranium mine reclamation, either in regulations or lease terms, reclamation objectives were developed to assist in determining the most appropriate reclamation measures for the Jackpile-Paguate uranium mine. The primary goal of these objectives is to reclaim and stabilize the minesite to restore productive use of the land and to ensure that adverse environmental impacts are reduced to the extent possible.

The reclamation proposals will be evaluated with the intent of achieving as many of the objectives as possible while realizing that no single reclamation proposal could meet all the objectives completely and that compromises would be required. Using post reclamation land use for livestock grazing as the common denominator and taking into account the major issues identified during the scoping process, the following reclamation objectives, in order of importance, were developed:

1. Ensure human health and safety.
2. Reduce the releases of radioactive elements and radionuclei to as low as reasonably achievable.
3. Ensure the integrity of all existing cultural, religious and archaeological sites.
4. Return the vegetative cover to a productive condition comparable to the surrounding area.
5. Provide for additional land uses that are compatible with other reclamation objectives and that are desired by the Pueblo of Laguna.
6. Eliminate the need for post-reclamation maintenance.
7. Blend the visual characteristics of the minesite with the surrounding terrain.
8. Employ the Laguna people in efforts that afford them opportunities to utilize their skills or train as appropriate.

The reclamation alternatives (except for the No Action Alternative) approach the reclamation objectives differently. The following is a brief summary of the reclamation alternatives analyzed in this EIS. A more complete description of these proposals is given in Tables 1-3, 1-4 and 1-5.

No Action Alternative

For this EIS, the No Action Alternative would mean that no reclamation work would be performed. The area would be secured to prevent unauthorized entry and an environmental monitoring program would be operated. Additional requests by the Pueblo of Laguna to utilize certain facilities for storage could be accommodated, provided such use would be temporary and deemed safe.

This alternative is not feasible because the Secretary of the Interior cannot approve a plan which does not provide a reasonable measure of protection to public health and safety, and does not reduce environmental impacts to the extent possible. This alternative is included and analyzed only to provide a benchmark that would allow decisionmakers to compare the magnitude of environmental effects for a given range of alternatives.

Green Book Proposal

Note: The Green Book Proposal was originally developed by Anaconda Minerals Company but was subsequently replaced by the 1985 Multiple Land Use Reclamation Plan on August 19, 1985. The Green Book is being carried forward in the Final EIS for continuity of impact analysis and consistency with the DEIS.

The open pits would be backfilled to at least three feet above ground water recovery levels as projected by Dames and Moore, 1983. All highwalls would be scaled to remove loose material. The rim of Gavilan Mesa would be cut back by mechanical means or blasting and the base of the highwall would be buttressed with waste and overburden. Waste dump slopes would be reduced to between 2:1 and 3:1; most slopes would be terraced. Jackpile Sandstone exposed by resloping would be covered with four feet of overburden and one foot of topsoil. All protore and waste material lying within 200 feet of the Rios Paguate and Moquino would be removed. Facilities would either be removed or cleaned up and left intact. All disturbed areas (pit bottoms, waste dumps, old roads, etc.) would be topsoiled and seeded. Reclamation would be considered complete when the weighted average for basal cover and production on revegetated sites equals or exceeds 70 percent of that found on comparable reference sites. The post-reclamation monitoring period would be a minimum of three years.

DOI Proposal (Monitor Option and Drainage Option)

This alternative was developed by the DOI. It is based on a series of technical reports, contracted studies and file data. Although similar to the Green Book Proposal in overall concept, it varies in important details.

Because of concerns over the environmental impacts of either ponded water or salt build-up in the open pits, DOI has identified two options for treatment of the pit bottoms: 1) a Monitor Option which would backfill the pits with protore, excess material from waste dump resloping and soil cover. Due to the excess material (approximately 19 million cubic yards), the estimated backfill elevations of the pit floors could be 40 to 70 feet higher than the Green Book proposed minimum. The pits would remain as closed basins, in which case the potential build-up of salt and saline water in the soils of the pit bottoms would be monitored. If soil problems are observed, additional backfill and revegetation would be required. The monitoring period would be of sufficient duration to determine the stable future water table conditions; and 2) a Drainage Option which would restore the natural mode

of overland runoff from the pit areas. Backfill volumes and elevations would be approximately the same as for the Monitor Option, but none of the pits would be left as closed basins. Open channels would be constructed with a gradient equal to or flatter than local natural watercourses to convey runoff from the pit areas to the Rio Paguate. This would avoid ponded water or undrained saline soils on the reclaimed minesite.

For both options, other aspects of reclamation would be the same. Highwall stability techniques would essentially be the same as the Green Book Proposal. With few exceptions, waste dump slopes would be reduced to 3:1, with no terracing. Treatment of Jackpile Sandstone and minesite facilities would be the same as the Green Book Proposal. Remove all protore and waste material lying within 200 feet of the Rios Paguate and Moquino; in addition, construct a permanent base or bridge on the Rio Moquino. All disturbed areas would be topsoiled and seeded. Reclamation would be considered complete when revegetated sites reach 90 percent of the density, frequency, foliar cover, basal cover and production of undisturbed reference areas. The post-reclamation monitoring period would vary for each parameter.

Laguna Proposal

This alternative was developed by the Pueblo of Laguna in consultation with their technical consultants. In May 1986, the Pueblo provided the DOI with details and/or changes to the Laguna Proposal which are reflected in the Final EIS.

Under this proposal, all pits would be backfilled 10 above groundwater recovery levels projected by Dames and Moore, 1983. In general, the top 15 feet of each highwall would be cut to a 45 degree angle. With few exceptions, waste dump slopes would be reduced to 3:1. Remove all contaminated material within 100 feet of the Rio Paguate. Remove waste dumps 50 feet back from the Rio Moquino and armor the toes of the dumps with riprap. Minesite facilities would be handled essentially the same as under the DOI's Proposal except that the rail spur would remain intact. Topsoiling, seeding techniques and other reclamation measures would be the same as DOI's Proposal. The post-reclamation monitoring period would vary from 3 to 20 years.

Anaconda Proposal (1985 Multiple Land Use Reclamation Plan)

The Jackpile and South Paguate open pits would be backfilled to an extent that would prevent chronic free-water ponding with groundwater levels controlled in the backfill by phreatophytic vegetation. The North Paguate open pit would be made into a water storage reservoir by diverting the Rio Paguate through the pit. The rest of Jackpile and North Paguate pit highwalls would be scaled or trimmed back a distance of 10 feet at a 3:1 slope. No additional modification of the South Paguate pit highwall is proposed. Waste dump slope modifications and topdressing requirements would vary. All Jackpile Sandstone and waste material would be moved back 50 feet from the Rios Paguate and Moquino. All buildings and other surface structures would be left intact where it is safe to do

so. Revegetation success would be based on a comparison of the entire revegetated area relative to an analogous reference area on a weighted average basis. Revegetated areas would be sampled for the third year after the last seeding or reseeding effort by or for Anaconda and year-to-year thereafter until success criteria is met.

Preferred Alternative

Pits would remain as closed basins. They would be backfilled to at least 10 feet above the Dames and Moore (1983) projected groundwater recovery levels. In general, the top 15 feet of each highwall would be cut to a 45 degree angle. All soil at the top of the highwall would be sloped 3:1. With few exceptions, waste dump slopes would be reduced to 3:1. There are two options for stream stabilization: Option A - to remove all material within 200 feet of the Rios Paguate and Moquino, and construct a concrete drop structure across the Rio Moquino and Option B: to remove all contaminated material within 100 feet of the Rio Paguate and to remove all waste dumps within 50 feet of the Rio Moquino and armoring the toes of the dumps with riprap. Facilities would either be removed or cleaned up and left intact. All disturbed areas (pit bottoms, waste dumps, old roads, etc.) would be topsoiled and seeded. Reclamation would be considered complete when revegetated sites reach 90 percent of the density, frequency, foliar cover, basal cover and production of undisturbed reference areas. The post-reclamation monitoring period would vary for each parameter.

SUMMARY OF IMPACTS

Table 1-6 presents a summary and comparison of environmental impacts for the reclamation proposals outlined in Tables 1-3 and 1-4. For more detailed impact analysis, refer to Chapter 3 - Environmental Consequences.

MITIGATING MEASURES

Mitigating measures have been incorporated into each of the reclamation proposals addressed in this EIS and additional measures have been identified through the EIS process. These measures are proposed stipulations to the final reclamation plan approved by the DOI. Any approved reclamation plan, including the preferred alternative, will require stipulations and monitoring to ensure compliance with reclamation measures and to minimize environmental impacts during reclamation. DOI personnel will be responsible for assuring that all reclamation criteria are met. This includes everything from verifying that the proper amount of backfill has been placed in the pits to collecting and reviewing radiological data. Details of the preferred monitoring plan are in Table 1-5. It is important to note that monitoring would reduce but not eliminate residual environmental impacts to the extent possible.

TABLE 1-3
SUMMARY OF RECLAMATION ALTERNATIVES

Anaconda Proposal

Laguna Proposal

DOI Proposal
(Monitor and Drainage Options)

Item	No Action Alternative	Green Book Proposal	Laguna Proposal	Anaconda Proposal
Pit Highwall				
Jackpile Pit Highwall	No Action	Stabilize by scaling and buttressing. Buttressing would be the same as Green Book Proposal. Additional treatment would consist of using blasting and mechanical methods to recontour the west face of Gavilan Mesa so that sandstone units would overall slope of the buttress would have a near vertical angle and shale units would be at their natural angle of repose. The upper 10 feet of stabilization may consist of removing top of highway by either blasting or hauling to an angle that crest would also be sloped 3:1 to prevent slumping and piping. A schematic diagram is shown in Appendix A (Figure A-6).	The top 15' of highwall would be cut to a 45 degree slope. All soil at the top of the highwall would be scaled 3:1. The highwall would be sloped 3:1. Roads leading to highwall areas would be removed by removal of loose debris. A schematic diagram is shown in Appendix A (Figure A-7).	Pit wall crests would be scaled 10 feet back at 3:1. The top 15' of highwall would be cut to a 45 degree slope. All soil at the top of the highwall would be scaled 3:1. The highwall would be sloped 3:1. Roads leading to highwall areas would be removed by removal of loose debris. A schematic diagram is shown in Appendix A (Figure A-7).
North Paguate Pit Highwall	No Action	Scale top of highwall to remove loose rock and debris.	Same measures as Jackpile pit highwall. Additionally, the 6-foot chain link.	Pit wall crests would be scaled 10 feet back at 3:1. A schematic diagram is shown in Appendix A (Figure A-7). Roads leading to highwall areas would be removed by landshaping and revegetation.
South Paguate Pit Highwall	No Action	Scale top of highwall to remove loose rock and debris.	Same measures as proposed for North Paguate pit highwall.	Pit wall crests would be scaled 10 feet back at 3:1. The highwall would be sloped 3:1. Roads leading to the top of the highwall would be scaled to remove loose debris. A schematic diagram is shown in Appendix A (Figure A-7). Additionally, the highwall would be fenced with 6-foot chain link.
1-15	No Action	Scale top of highwall to remove loose rock and debris.	Same as Green Book Proposal. In addition, the upper 10 feet of alluvial cover at the highwall crest would be sloped 3:1 to prevent slumping and piping. A schematic diagram is shown in Appendix A (Figure A-7). The existing highwall fence may have to be realigned.	The top 15' of highwall would be cut to a 45 degree slope. All soil at the top of the highwall would be scaled 3:1. The highwall would be sloped 3:1. Roads leading to highwall areas would be removed by removal of loose debris. A schematic diagram is shown in Appendix A (Figure A-7).
Waste Dumps	No Action			

TABLE 1-3 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Monitor and Drainage Options)	Anaconda Proposal	Preferred Alternative
<u>Protoe Stock-Piles</u>	No Action	Use all protoe as backfill material in pit areas. Cover with 4 feet of overburden and 1 foot of topsoil.	Use all protoe as backfill material in pit areas. Cover with 3 feet of overburden and 2 feet of Tres Hermanos Sandstone or alluvial material.	Protoe would be left in present locations and stabilized. Small isolated piles would be consolidated into nearby larger piles and stabilized. Portions of stockpiles along active waterways would be relocated away from the stream area and be placed adjacent to the remainder of the pile or other existing piles.	Use all protoe as backfill material in pit areas. Cover with 3 feet of overburden and stabilized. Small isolated piles would be consolidated into nearby larger piles and stabilized. Portions of material.
<u>Site Stability and Drainage</u>	<u>Stream Stability</u>	No Action	Same as Green Book Proposal. In addition, construct a permanent cement base or a flood-proof bridge on the Rio Moquino immediately above its confluence with Rio Paguate.	All contaminated soils and fill material within 100 feet of the Rio Paguate west of its confluence with the Rio Moquino would be excavated and relocated to the open pits. For the Rio Moquino, waste dumps S, T, U, N and N2 would be pulled back 50 feet from the centerline of the stream channel. The toes of these dumps would be armored with riprap. A concrete drop structure would be constructed across the Rio Moquino approximately 400 feet above the confluence with the Rio Paguate.	All Jackpile sandstone and overburden waste material would be moved back 50 feet from the streams' centerlines. The Rio Paguate would be diverted through North Paguate pit.
	<u>Arroyo Headcutting</u>	No Action	Same as Green Book Proposal. In addition, construct a permanent cement base or a flood-proof bridge on the Rio Moquino immediately above its confluence with Rio Paguate.	Armor arroyos south of waste dumps I, Y and Y2, and the arroyo west of I, Y and Y2. Stabilization design same as DOI's Proposal. The headcuts encountered during reclamation would be stabilized by riprap. A schematic diagram is shown in Appendix A (Figure A-12).	Certain headcuts which have the potential of encroaching upon dumps would be armored or riprapped. Stabilization design would be the same as the Green Book Proposal.
	<u>Blocked Drainages</u>	No Action	Remove waste dump J and protoe stockpiles SP-17BC and SP-6-B to unblock ephemeral drainage on south side of mesite. Two blocked drainages north of FD-1 and P dumps would remain blocked. Remainder of mesite, excluding open pits, would drain to Rio Paguate and Moquino.	Remove waste dump J and protoe stockpiles SP-17BC and SP-6-B to unblock ephemeral drainage on south side of mesite. The drainage north of dump FD-1 would be directed north and wear into a reestablished arroyo. The drainage north of dump P would remain blocked.	Remove waste dump J and protoe stockpiles SP-17BC and SP-6-B to unblock ephemeral drainage on south side of mesite. The drainage north of FD-1 and P dumps would remain blocked. Remainder of mesite, excluding open pits, would drain to Rio Paguate and Moquino.

TABLE 1-3 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Monitor and Drainage Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
<u>Surface Facilities/ Structures</u>						
Lease No. 1	No Action	Remove all facilities including houses, offices, shops, sewage systems, the airstrip, parking areas and roads (except as noted under "Access Routes" below). Also remove all operational and maintenance equipment, including machinery and tools. Leave power lines structurally sound and radiologically safe.	Same as Green Book Proposal. Remove certain facilities on Lease No. 1. The Department could approve this request provided the facilities were and poles passing through Lease No. 1 and serving areas north of lease undisturbed; remove all others. Clear land surface (except pit highwalls and natural outcrops) of radiological material (e.g., Jackpile Sandstone) until gamma readings of twice background or less are achieved. Then grade and seed areas.	Demolish and remove all buildings on Lease No. 1 except the Geology building, Miner Training center and Open Pit offices. Clear land surface (except pit highwall and natural outcrops) of radiological material (e.g., Jackpile Sandstone) until gamma readings of twice background or less are achieved. Then grade and seed areas.	All buildings, other surface structures and support facilities would be left intact where it is safe to do so.	Demolish and remove all buildings on Lease No. 1 except the Geology building, Miner Training center and Open Pit offices. Clear land surface (except pit highwall and natural outcrops) of radiological material (e.g., Jackpile Sandstone) until gamma readings of twice background or less are achieved. Then grade and seed areas.
Lease No. 4	No Action	Leave all structures and facilities associated with P-10 Mine and New Shop, including all buildings, roads, parking lots, sewage systems, power lines and poles. Remove all operational and maintenance equipment, including tools, machinery, supplies and the P-10 conveyor. Clear all permanent structures and land surfaces (except pit highwalls and natural outcrops) of radiological material until gamma readings of twice background or less are achieved. Then grade and seed areas. Remove non-salvageable contaminated buildings and materials to pit for disposal.	Same as Green Book Proposal.	Same as Green Book Proposal.	All buildings, other surface structures and support facilities would be left intact where it is safe to do so.	All buildings, other surface structures and support facilities would be left intact where it is safe to do so.
Access Routes	No Action	Clear 4 major roads within minesite of radiological material and leave after reclamation for post-mining use. These access routes include: 1) access road from P-10 and New Shop to State Highway 279; 2) main road through mine; 3) road that passes between housing area and North Oak Canyon Mesa and then proceeds to Jackpile Well P-10; and 4) road to Jackpile Well No. 4. Remove all other roads (except on Lease No. 4), then grade and seed the areas.	Same as Green Book Proposal.	Same as Green Book Proposal.	The 4 major roads which cross the lease areas would remain for post-reclamation access.	The 4 major roads within minesite areas would remain for post-reclamation access.
Water Wells	No Action	Leave Jackpile Well No. 4, P-10 Well, New Shop Well and Old Shop Well, and 3 wells and their associated sheltering structures (near housing area). Remove pumps, riser pipe, wiring and water storage tanks. Also leave wells established for future monitoring purposes. Cap all wells to prevent dust, soil and other contaminants from entering well casing.	Same as Green Book Proposal.	Same as Green Book Proposal.	All wells and associated structures/equipment would remain.	Leave Jackpile Well No. 4, P-10 Well, New Shop Well and Old Shop Well, and 3 wells and their associated sheltering structures (near housing area). Remove pumps, riser pipe, wiring and water storage tanks. Also leave wells established for future monitoring purposes. Cap all wells to prevent dust, soil and other contaminants from entering well casing.

TABLE 1-3 (Continued)

Item	No Action Alternative	Green Book Proposal (Monitor and Drainage Options)	DOI Proposal (Monitor and Drainage Options)	Laguna Proposal	Anacoda Proposal	Preferred Alternative	
Rail Spur	No Action	Remove and salvage rail spur from Santa Fe Railroad main line to Jackpile Mine. Remove underlying ballast material and relocate to one of mine pits. Grade roadbed to conform with local relief and then seed it. Demolish Quirk loading dock and haul it to pit. Clear reclaimed roadbed and loading dock of radiological material (i.e., ore spillage) until gamma readings of twice background or less are achieved.	Same as Green Book Proposal except the Department could approve the request to leave the rail spur intact. This approval would be contingent upon the rail spur being radiologically safe.	The rail spur would be left intact and cleared of radiological material until gamma readings of twice background or less are achieved. Demolish Quirk loading dock and haul it to pit.	Rail spur would remain intact with minimal radiological clean-up of spilled ore. Demolish Quirk loading dock and haul it to pit.	The rail spur would be left intact and cleared of radiological material until gamma readings of twice background or less are achieved. Demolish Quirk loading dock and haul it to pit.	All drill holes would be plugged according to the State Engineer's requirements. A 5-foot surface concrete plug would also be placed in each hole. Any cased holes would have the casing cut off at the surface. In addition, areas around drill holes would be seeded. Any exploration roads not wanted by the Pueblo would be reclaimed.
<u>Drill Holes</u>	No Action	Drill holes would be identified by field investigations and review of existing drilling records. Upon resumption of reclamation activities, upper 5 feet of holes would be plugged with concrete.	All drill holes would be plugged according to the State Engineer's requirements. A 5-foot surface concrete plug would also be placed in each hole. Any cased holes would have the casing cut off at the surface. In addition, areas around drill holes would be seeded. Any exploration roads not wanted by the Pueblo would be reclaimed.	Same as DOI's Proposal.	Same as Green Book Proposal.	Same as Green Book Proposal.	
<u>Underground Modifications</u>	<u>Ventilation Holes</u>	No Action	Place 10-foot concrete surface plug in each vent hole. Secure plug by either steel pinning or belling out to prevent downward slippage. Contour and seed areas around vent holes.	Backfill vent holes with waste material (Dakota Sandstone and Mancos Shale) to within 6 feet of surface. Remove surface casing, install steel support pins in walls of vent holes, and pour 6-foot concrete plug from backfill to surface. Contour and seed areas around vent holes.	Backfill vent holes with waste material (Dakota Sandstone and Mancos Shale) to within 6 feet of surface. Remove surface casing, install steel support pins in walls of vent holes, and pour 6-foot concrete plug from backfill to surface. Contour and seed areas around vent holes.	Backfill vent holes with waste material (Dakota Sandstone and Mancos Shale) to within 6 feet of surface. Remove surface casing, install steel support pins in walls of vent holes, and pour 6-foot concrete plug from backfill to surface. Contour and seed areas around vent holes.	
Adits and Declines	No Action	Construct concrete bulkhead approximately 680 feet below portal of P-10 decline. Backfill decline from bulkhead to ground surface with Dakota Sandstone and Mancos Shale. Place sufficient material over portal to allow for compaction and settling. Shape ground surface above buried portal then top-dress and seed. Bulkhead and backfill Alpine mine entry. Cover mine entries not previously plugged by backfilling.	Same as Green Book Proposal. Additionally, bulkhead and backfill H-1 mine adits and backfill adits at P-13 and NJ-45 mines.	Same as DOI's Proposal.	Same as Green Book Proposal. NJ-45 adits would be bulkheaded and backfilled approximately 25 feet back from each entry.	Stabilization of P-10 would be the same as Green Book Proposal. The H-1 mine adits would be bulkheaded and backfilled to approximately 25 feet back from each entry.	

TABLE 1-3 (Continued)

Item	DOI Proposal (Monitor and Drainage Options)		Anaconda Proposal		Preferred Alternative
	No Action Alternative	Green Book Proposal	Laguna Proposal	Anaconda Proposal	
Revegetation Methods	No Action	Following final sloping and grading, top dress areas to be planted with 1 foot of material composed primarily of Tres Hermanos Sandstone (stockpiled at three locations within mine- all topsoil borrow area southeast of site). In order to meet top dressing J and H dumps may be needed. volume requirements, obtain additional material from topsoil borrow area comprising 44 acres. Following topsoil removal, contour disturbed borrow area, then fertilize, seed and mulch.	A minimum of one foot of topsoil would be placed on all disturbed areas. Additional soil for the northern portion of the mine would be obtained from the relocation of the arroyo on the north side of dump FD-1 and from a borrow site along the Rio Mosquino immediately north of dumps S and T. Additional soil for the southern portion of the mine would be obtained from a borrow site southeast of dumps J and H.	Following final sloping and grading, top dress pit bottoms with 24" top dress pit bottoms with 18" of topdress areas with 18" of topsoil.	Following final sloping and grading, top dress pit bottoms with 24" waste dump with 18" and all other areas within the minesite with 12" of material composed primarily of Tres Hermanos Sandstone (stockpiled at three locations within minesite). In order to meet top dressing volume requirements for the northern portion of the minesite, obtain additional material from topsoil borrow area in the Rio Moquino floodplain comprising 44 acres. For the southern portion of the minesite, additional topsoil of the material located east of J and H dumps may be needed. Following topsoil removal, contour disturbed borrow area, then fertilize, seed and mulch.
Surface Preparation	No Action	After applying top dressings, fertilizer areas to be planted, followed by all areas would be contour furrowed. disk to a depth of 8 to 12 inches. Complete surface preparation, where conditions dictate, with compactor roller or sheepfoot roller to create shallow depressions for water collection, water retention and erosion control.	Soils would be conditioned by disking, mulching and adding soil nutrients as necessary. All slopes steeper than 5:1 would be contour furrowed.	After applying topdressing, areas would be fertilized and then disked. Contour furrowing or land followed by disk to a depth of 8 inches and then contour furrow.	After applying top dressing, fence entire minesite to prevent imprinting may be used on sloping terrain.
Seeding and Seed Mixtures	No Action	In most situations, plant seed mixture with range land drill. Broadcast fence entire minesite to prevent livestock grazing. Seeding methods seeding combined with hydromulching may be used on inaccessible sites or may be used on inaccessible sites or if determined to be more feasible than drilling. For both methods, seed mixture would consist mainly of native plant species possessing qualities compatible with post-grazing use and adapted to local environment. Following drill seeding, apply straw mulch at about 2 tons per acre, and crimp into place with a notched disk.	Before seeding operations begin, broadcast fence entire minesite to prevent livestock grazing. In most situations, plant seed mixture proposed for rest of minesite. Application and treatment of straw with range land drill. Seeding combined with hydromulching mulch same as Green Book Proposal.	Seeding method same as Green Book Proposal. Same as DOI's Proposal.	Before seeding operations begin, fence entire minesite to prevent fence entire minesite to prevent livestock grazing. In most situations, plant seed mixture proposed for rest of minesite. Application and treatment of straw with range land drill. Seeding combined with hydromulching mulch same as Green Book Proposal. Same as Green Book Proposal. See mixtures for pit bottoms would differ from mixtures proposed for rest of minesite.

TABLE I-3 (Continued)

Item	No Action Alternative	Green Book Proposal (Monitor and Drainage Options)	DOI Proposal (Monitor and Drainage Options)	Anaconda Proposal	Preferred Alternative
<u>Revegetation Success</u>	Plant establishment would be considered successful when weighted average Analysis (CSA method), plant establishment would be considered successful when revegetated sites equalled or exceeded 70 percent of weighted average for basal cover and production on comparable reference sites on undisturbed lands within lease areas (but no sooner than 3 years following seeding). Prevent livestock grazing until 90 percent comparability values are met. At end of 10-year monitoring period, if unsuccessful trend is shown, reclamation may be necessary to achieve success criteria. Success criteria are discussed under Flora in Chapter 3.	Using the Community Structure approach, sites would be considered successful when revegetated areas reach 90 percent of the density, frequency, and cover of existing comparison test plots. Data would be collected for a minimum of 3 years following completion of reclamation.	Vegetation would be monitored and supplemented until the density and percent cover of the revegetated areas equals or exceeds 90 percent of the species density and cover of undisturbed reference areas (but not sooner than 10 years following seeding). Prevent livestock grazing until 90 percent comparability values are met. At end of 3-year monitoring period, if unsuccessful trend is shown, reclamation may be necessary to achieve success criteria. Success criteria are discussed under Flora in Chapter 3.	Revegetation success would be based on a comparison of the entire revegetated area relative to an analogous reference area on a weighted average basis. Revegetated areas would be sampled for the third year after the last seeding or reseeding effort by or therefrom until success criteria is met.	Using the Community Structure Analysis (CSA) or comparable method, plant establishment would be considered successful when revegetated areas reach 90 percent of the density, frequency, foliar cover, basal cover and production of undisturbed reference areas (but not sooner than 10 years following seeding). Prevent livestock grazing until 90 percent comparability values are met. At end of 10-year monitoring period, if unsuccessful trend is shown, reclamation may be necessary to achieve success criteria. In the pit bottoms, vegetation would be sampled annually for radionuclide and heavy metal uptake.
<u>Monitoring</u>	Continue Anaconda's present monitoring program minimum of 3 years thereafter. Monitoring activities to be continued would include: meteorologic sampling, air particulate sampling, radon sampling (ambient), radon exhalation sampling, gamma survey, soil and vegetation sampling, water monitoring and subsidence. Refer to Table I-5 for details of the Green Book proposed monitoring program.	Same as Green Book Proposal, except the post-reclamation monitoring period would vary for each parameter. In addition, the monitoring program would be expanded to include: radon daughter levels (working levels) in any remaining mine buildings and ground water recovery levels/salt build-up in the open pits. The ground water monitoring period would be of sufficient duration to determine the stable future water table conditions. Refer to Table I-5 for details of DOI's proposed monitoring program.	Similar to Green Book Proposal. Refer to Table I-5 for details of Anaconda's proposed monitoring program.	Monitoring would be broken down into three phases: 1) monitoring during reclamation, 2) monitoring after reclamation, and 3) long-term monitoring. Refer to Table I-5 for details of the Pueblos proposed monitoring program.	The monitoring period would vary for each parameter. Monitoring activities to be continued would include: meteorologic sampling, air particulate sampling, radon sampling (ambient), radon exhalation sampling, gamma survey, soil and vegetation sampling, water monitoring, water monitoring, water monitoring, and subsidence. In addition, the monitoring program would be expanded to include: radon daughter levels (working levels) in any remaining mine buildings and ground water recover levels/salt build-up in the open pits. The ground water monitoring period would be of sufficient duration to determine the stable future water table conditions. Refer to Table I-5 for details of the preferred monitoring plan.
<u>Security</u>	Continue Anaconda's present security program to prevent unauthorized access.	Anaconda would continue to have full responsibility for mine access and security during reclamation and monitoring activities. However, security during monitoring phase would require cooperation from Pueblo of Laguna and BIA to prevent livestock grazing on revegetated sites.	Same as Green Book Proposal.	Control of mine site access and security would continue during reclamation and monitoring activities. However, security during monitoring phase requires cooperation from Pueblo of Laguna and BIA to prevent livestock grazing on revegetated sites.	DOI would monitor and inspect every aspect of reclamation activities to ensure compliance with all reclamation requirements.
<u>Compliance</u>	BLM and BIA would continue to ensure compliance with the present monitoring program and security measures.	DOI would monitor and inspect every aspect of reclamation activities to ensure compliance with the present monitoring program and security measures.	Same as Green Book Proposal.	Same as Green Book Proposal.	DOI would monitor and inspect every aspect of reclamation activities to ensure compliance with all reclamation requirements.

TABLE 1-3 (Concluded)

		DOI Proposal (Monitor and Drainage Options)			Anaconda Proposal		Preferred Alternative	
Item	No Action Alternative	Green Book Proposal	Laguna Proposal					
<u>Reclamation Completion</u>	N/A	Reclamation considered complete with occurrence of the following: 1. When weighted average for basal cover and production on all re-vegetated sites equalled or exceeded 70 percent of weighted average for basal cover and production on comparable reference sites (but not sooner than 3 years following seeding); or 2. If livestock grazing occurred on any revegetated area before the above weighted average success criteria were met.	Reclamation would be considered complete when revegetated sites reach 90 percent of the density, frequency, basal cover, and production of undisturbed reference areas (but not sooner than 10 years following seeding). In addition, gamma radiation levels must be no greater than twice background over the entire area prior to meeting the weighted average success criteria.	Same as DOI's Proposal except a minimum of 3 years would be required before determining if re-vegetation criteria were met. Although intensive mine-seeding could end as little as three years after completion of reclamation operations, long-term monitoring and maintenance of the entire background over the entire mine-site could continue indefinitely.	Reclamation considered complete with occurrence of the following: 1) If the revegetated areas meet or exceed the weighted acreage success criteria as described in the 1985 Plan; or 2) If livestock grazing occurs on any revegetated area prior to meeting the weighted average success criteria.	Reclamation would be considered complete when revegetated sites reach 90 percent of the density, frequency, basal cover, and production of undisturbed reference areas (but not sooner than 10 years following seeding). In addition, gamma radiation levels must be no greater than twice background over the entire area prior to meeting the weighted average success criteria.	Reclamation considered complete with occurrence of the following: 1) If the revegetated areas meet or exceed the weighted acreage success criteria as described in the 1985 Plan; or 2) If livestock grazing occurs on any revegetated area prior to meeting the weighted average success criteria.	Reclamation would be considered complete when revegetated sites reach 90 percent of the density, frequency, basal cover, and production of undisturbed reference areas (but not sooner than 10 years following seeding). In addition, gamma radiation levels must be no greater than twice background over the entire area prior to meeting the weighted average success criteria.
<u>Post-Reclamation Land Uses</u>	N/A	Livestock grazing. Specifically excluded are habitation, farming and construction of commercial or industrial facilities.	Limited Livestock grazing, light manufacturing, office space, mining, processing, office space, mining and major equipment storage. Specifically excluded are habitation, resource development and protection; recreational use and mineral and farming.	Livestock grazing, light manufacturing, office space, mining and major equipment storage. Specifically excluded are habitation, resource accessibility.	Limited Livestock grazing, light manufacturing, office space, mining and major equipment storage. Specifically excluded are habitation, resource development and protection; recreational use and mineral and farming.	Livestock grazing, light manufacturing, office space, mining and major equipment storage. Specifically excluded are habitation, resource accessibility.	Livestock grazing, light manufacturing, office space, mining and major equipment storage. Specifically excluded are habitation, resource accessibility.	

TABLE 1-4
WASTE DUMPS AT THE JACKPILE-PAGUATE URANIUM MINE
(existing conditions, proposed modifications and treatments)

Dump(s)	Acres to Date ^a	Existing Conditions		Proposed Modifications and Treatments					
		Reclaimed ^b	Dump Composition ^c	Present Slope (horizontal:vertical) ^d	-Mode Value ^e	DOI Proposal (Monitor and Drainage Options) ^f	Laguna Proposal ^g	Anaconda's ^h Proposal ⁱ	Preferred Alternative ^j
A	23		Outer surface: mainly shales, mixed with some Tres Hermanos Sandstone (THS)	1.44:1	Slope 3:1	Same as Green Book Proposal	Same as Green Book Proposal	Same as Green Book Proposal; cut and fill balance (CFB) on slope	Slope 3:1
B	71		Outer surface: mainly shales mixed with some THS	1.50:1	Slope 3:1	Same as Green Book Proposal	Same as Green Book Proposal	Slope west and south sides 3:1 by CFB.	Slope 3:1
C	21	X	Topsoil: 24 inches THS mixed with some shales; Under topsoil: THS mixed with shales	1.60:1	No change—most of dump slope covered by sloping of dump FD-2.	Same as Green Book Proposal, except any slopes not covered by FD-2 would be sloped 3:1.	Same as DOI's Proposal	No change – except any slopes not covered by FD-2 would be sloped 3:1.	Slope 3:1
D	14	X	Topsoil: 24 inches THS mixed with some shales; Under topsoil: THS mixed with shales	1.64:1	No change	Slope 3:1	Same as DOI's Proposal	Same as Green Book Proposal	Slope 3:1
E	12	X	Topsoil: 24 inches THS mixed with some shales; Under topsoil: THS mixed with shales	1.38:1	No change	Slope 3:1	Same as DOI's Proposal	Same as Green Book Proposal	Slope 3:1
F	73	X	Topsoil: 18-24 inches THS mixed with some shales; Under topsoil: mainly shale with some THS and Jackpile Sandstone (JSS)	1.50:1	No change	Slope 3:1	Same as DOI's Proposal	Same as Green Book Proposal	Slope 3:1
1-22									
FD-1	168		Entire dump: primarily shales with JSS and some THS on west end	1.45:1	Dump moved back approx. 200 feet from arroyo. One terrace with 2:1 intermediate slopes; over all slopes, from 2:3:1 to 3:1; 5-foot-high erosion-control berm placed between toe of dump and arroyo.	Dump moved back approx. 120 feet from arroyo. Boulder size talus left at toe of dump sloped back 50 feet from 3:1. Rirrap would be drainage and sloped 3:1.	The arroyo blocked by talus left at toe of dump would be re-sloped to the north side of dump moved back 50 feet from 3:1. Rirrap would be drainage and sloped 3:1. Slope material would be removed.	Dump moved back approx. 120 feet from arroyo. Boulder size talus left at toe of dump to stabilize arroyo against head-cutting; No terracing; slope 3:1.	Slope 2.7:1; top of dump lowered 50 feet.
FD-2	25		Entire dump: shales and THS	1.48:1	Two terraces with 2:1 intermediate slopes; overall slope 2:3:1; top of dump lowered about 50 feet.	Slope 2.7:1; top of dump lowered 50 feet.	Allow dump to gradually settle.	Slope 2.7:1; top of dump lowered 50 feet.	

0400042

TABLE 1-4 (Cont'd)

Proposed Modifications and Treatments

Existing Conditions		Present Slope (horizontal/vertical) Dump Composition -Mode Value-		DOI Proposal (Monitor and Drainage Options) ^c		Laguna Proposal/ Proposal d/		Anaconda's Proposal ^e		Preferred Alternative f/	
Dump(s)	Acres	Reclaimed ^g to Date ^h	Dump Composition	Green Book Proposal ^b							
FD-3	10		Outer surface: JSS, some shales and THS on slopes	1.40:1	Dump moved back about 200 feet from arroyo. One terrace with 2:1 intermediate slopes; overall slopes from 2.3:1 to 3:1; 5-foot high erosion-control berm placed between toe of dump and arroyo.	Slope 3:1.	Dump moved back about 120 feet from arroyo. No terracing; slope 3:1. 3:1. Boulder-size talus left at toe of dump left at toe of dump to stabilize arroyo against headcutting.	Move back 50 feet from arroyo. Slope 3:1 on east side of dump by CFB and west side by removal.	Dump moved back about 120 feet from arroyo. No terracing; slope 3:1. Boulder size talus left at toe of dump to stabilize arroyo against headcutting.		
G	49	X	Topsoil: 18-24 inches THS mixed with some shales; Under topsoil: shales mixed with JSS exposed on surface prior to covering	1.39:1	No change	Slope 3:1	Same as DOI's Proposal	Same as Green Book Proposal	Slope 3:1		
H	7		Outer surface: JSS and some shales	1.43:1	Dump removed and back-filled into Jackpile pit—underlying area reclaimed.	Same as Green Book Proposal	Same as Green Book Proposal	Slope 3:1 by CFB.	Dump removed and backfilled into Jackpile Pit—underlying area reclaimed.		
I	57	X	Topsoil: 18-24 inches THS; Under topsoil: shales mixed with JSS exposed prior to covering	1.75:1	Approx. 36 acres of slope to be modified 3:1; slope south portion 2.5:1. by using one terrace with 2:1 intermediate slopes. Overall slope 2.2:1; 21 acres would remain at present configuration of 1.5:1.	Slope east portion 3:1	Slope 3:1 by CFB on east and south sides.	Slope 3:1	Dump removed and backfilled into Jackpile pit—underlying area reclaimed.		
J	15	X	Topsoil: 18-24 inches alluvial material taken from floodplain area; Under topsoil: JSS	1.37:1	Dump removed and back-filled into Jackpile pit—underlying area reclaimed.	Same as Green Book Proposal	Same as Green Book Proposal	Same as Green Book Proposal	Dump removed and backfilled into Jackpile pit—underlying area reclaimed.		
K	22	X	Topsoil: 24 inches THS; Under topsoil: mainly THS mixed with shales	1.66:1	No change	Slope 3:1	North slope of dump pulled back 25 feet from escarpment; slope 3:1.	Same as Green Book Proposal	Slope 3:1		
L	40	X	Topsoil: 24 inches THS; Under topsoil: mainly shales mixed with THS	4.45:1	Approx. 18 acres left to reclaim. Slopes now at 1.5:1 would be sloped 3:1.	Same as Green Book Proposal	Same as Green Book Proposal	Slope 3:1 by CFB.	Approx. 18 acres left to reclaim. Slopes now at 1.5:1 would be sloped 3:1.		

Table 1-4 (Cont'd)

Existing Conditions				Proposed Modifications and Treatments			
Dump(s)	Acres Reclaimed to Date ^a	Dump Composition	Present Slope (horizontal:vertical) -Mode Value-	DOI Proposal (Monitor and Drainage Options) ^c /	Laguna Proposal/d/ Anaconda's Proposal/e/	Preferred Alternative f/	
N		Outer surface: mixed shales and some THS	1.20:1	Dump moved back approx. 200 feet from Rio Moquino and slope 2:1 (no terraces); 5-foot-high erosion-control berm placed between toe of dump and Rio Moquino.	Same as Green Book Proposal except dump sloped 3:1.	Dump moved back centerline of Rio Moquino and slope 3:1; toe of dump covered with riprap. Riprap would extend from remaining slopes to low the existing grade 3:1 by removal of the Rio Moquino to above the 100 year flood level.	Reduce small slopes on top surface 3:1 by CFB; move dump 50 feet back from stream centerline and reduce remaining slopes to Option A: Move dump back 200 feet from Rio Moquino and slope 3:1 or Option B: Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
N2		Outer surface: mixed shales and some THS	1.66:1	Dump moved back 200 feet from Rio Moquino and slope 2:1 (no terraces); 5-foot high erosion-control berm placed between toe of dump and Rio Moquino.	Same as Green Book Proposal except dump sloped 3:1.	Move dump back 50 feet from stream centerline and slope 3:1 by removal.	Option A: Move dump back 200 feet from Rio Moquino and slope 3:1 or Option B: Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
0 ^p , P ₁₂ , P ₂	35	X	Topsoil: 24 inches THS; Under topsoil: mainly THS with limited amounts of shale	1.30:1	No change	Slope 3:1	Same as DOI's Proposal
Q	52		Outer surface: JSS mixed with some shales	1.55:1	Slope 3:1	Same as Green Book Proposal	Slope 3:1
R	14		Outer surface: shales mixed with some JSS	2.35:1	Slope 3:1	Same as Green Book Proposal	Slope 3:1
S	96	X	Topsoil: 24 inches THS; Under topsoil: THS with some shales	1.5:1	Southern 26 acres seeded and sloped 3:1. 60 acres would remain at present slope configuration of 1.5:1.	Slope 3:1 on south and southeast by CFB. Dump.	Option A: Slope 3:1 or Option B: Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
0400044	175		Outer surface: shales and THS on slopes	1.40:1	Dump moved back a minimum of 150 feet from arroyo (Oak Canyon). Overall slopes between 2:1 and 3:1; some areas with one terrace.	Dump moved back a minimum of 130 feet from arroyo and sloped 3:1. pulled back 25 feet from arroyo and sloped 3:1.	Southern slope of South Dump would be pulled back 25 feet from arroyo and sloped 3:1.

TABLE 1-4 (Concluded)

Existing Conditions						Proposed Modifications and Treatments			or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
Dump(s)	Acres	Reclaimed to Date ^a	Dump Composition	Present Slope (horizontal:vertical) -Mode Value-	Green Book Proposal ^b	DOI Proposal (Monitor and Drainage Options) ^c	Laguna Proposal ^d	Anaconda's Proposal ^e	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
T	27	X	Topsoil: 27 acres have 18-24 inches THS; Under topsoil: JSS and some shales exposed prior to covering. 5 acres have JSS and some shales on slopes.	1.45:1	Approx. 1.2 acres moved back about 200 feet from the Rio Moquino and sloped 3:1.	Dump moved back 200 feet from the Rio Moquino and sloped 3:1; by removal.	Move back 50 feet from stream centerline and slope 3:1.	Option A: Move back 200 feet from the Rio Moquino and sloped 3:1.	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
U	61		Outer surface: JSS and some shales on slopes	1.45:1	Dump moved back approx. 200 feet from Rio Moquino and slope 3:1.	Dump moved back 200 feet from Rio Moquino and slope 3:1.	Same measures as N	Option A: Same measures as T	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
V	51		Outer surface: JSS, shales and some THS on slopes	1.40:1	One terrace with 2:1 intermediate slopes; overall slope 2:2:1.	Slope 3:1	Same as DOI's Proposal.	Slope 3:1 by CFB and removal	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
W	7		Outer surface: THS and shales	1.46:1	No change due to rock cover on slopes.	Slope 3:1	Same as Green Book Proposal	Slope 3:1 by CFB.	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
X	9	X	Topsoil: 18-24 inches THS; Under topsoil: JSS and some shales	No exterior slopes	No change.	Slope 3:1	Same as Green Book Proposal	Same as Green Book Proposal	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
Y	30	*	Outer surface: JSS with some shales and THS	1.44:1	One terrace with 2:1 intermediate slopes; overall slope 2:3:1.	Slope 3:1	Same as DOI's Proposal	Slope 3:1 by CFB.	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.
Y2	15	X	Topsoil: 18-24 inches of THS on top and none on slopes; Under topsoil: JSS and some shales exposed prior to covering	1.50:1	Two terraces with 2:1 intermediate slopes; overall slope 2:4:1.	Slope 3:1.	Slope 3:1 by CFB.	Slope 3:1	or Dump moved back from centerline of Rio Moquino and sloped 3:1; toe of dump covered with riprap. Riprap would extend from below the existing grade of the Rio Moquino to above the 100 year flood level.

Table 1-4 (Cont'd)

Source: Dump composition data from Anaconda Minerals Company 1982c and 1984a; present slope data from BLM 1984.

Notes: a/ "Reclaimed to date" does not necessarily mean reclamation is complete. Previously reclaimed dumps proposed for additional treatment are b/ Green Book Proposal includes:

- 5-foot-high erosion control berms placed on all dump crests and terraces.
- Dump tops contoured to channel runoff to open-chute rock-lined drainage structures (dumps A, FD-1, FD-2, FD-3, I, N, O, PI, S, South Dump, T, U, V, Y and Y2).
- Dumps which have Jackpile Sandstone on their outer surface and any Jackpile Sandstone exposed during resloping would be covered with 4 feet of overburden and 1 foot of topsoil.
- Cover dumps that do not contain Jackpile Sandstone on their outer surface with 1 foot of topsoil.
- Boulder-sized material placed on slopes as necessary to help stabilize them.

c/ DOI Proposal (Monitor and Drainage Options) includes:

- 5-foot-high erosion control berms placed on all dump crests and all dump tops sloped slightly away from their outer slopes.
- No drainage structures.
- All dump slopes would be contour furrowed.
- All dump slopes contoured so that their toes are convex (to protect slopes from erosion).
- Dumps which have Jackpile Sandstone on their outer surface and any Jackpile Sandstone exposed during resloping would be covered with 3 feet of overburden and 18 inches of topsoil.
- Cover dumps that do not contain Jackpile Sandstone on their outer surface with 18 inches of topsoil.
- Boulder-sized material placed on slopes as necessary to help stabilize them.

d/ Laguna Proposal includes:

- All dump tops sloped slightly away from their outer slopes; slopes would be a minimum of 50:1 and a maximum of 10:1.
- All dump slopes would be contour furrowed.
- No drainage structures.

e/ Anaconda Proposal includes:

- Where practical, dump slopes contoured so that their toes are convex.
- Where practical, dump slopes constructed on dump areas.
- A flat channel moisture conservation berm system would be constructed on dump areas.
- A flat channel moisture conservation berm system would be constructed on all topsoiled waste piles which include backfilled waste.

f/ Preferred Alternative includes:

- Contour furrowing or land imprinting would be used on all topsoiled waste piles which include backfilled waste.
- 5-foot-high erosion control berms placed on all dump crests and all dump tops sloped slightly away from their outer slopes.
- No drainage structures.
- All dump slopes would be contour furrowed.
- All dump slopes contoured so that their toes are convex (to protect slopes from erosion).
- Dumps which have Jackpile Sandstone on their outer surface and any Jackpile Sandstone exposed during resloping would be covered with 3 feet of overburden and 18 inches of topsoil.
- Cover dumps that do not contain Jackpile Sandstone on their outer surface with 18 inches of topsoil.
- Boulder-sized material placed on slopes as necessary to help stabilize them.

TABLE 1-5

SUMMARY OF PROPOSED MONITORING PROGRAMS
[No. of Stations (S)/Monitoring Frequency (F)/Parameters (P)/Duration (D)]

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Subsidence	S - 89 P - Quarterly P - Ground Movement D - In Perpetuity	S - 89 F - Quarterly P - Ground Movement D - During reclamation and 3 years thereafter	S - 89 F - Quarterly P - Ground Movement D - Until State Highway 279 is realigned	S - 63 F - Semi-annually P - Ground Movement D - 1 Year Minimum	S - Stations along State Highway 279 F - Semi-annually P - Ground Movement D - During reclamation and 3 years thereafter	S - 89 F - Quarterly P - Ground Movement D - Until State Highway 279 is realigned
Surface Water/ Quality	S - 7 F - Monthly P - pH, conductivity, TDS, HCO ₃ , Cl, SO ₄ , Na, K, Ca, Mg, NO ₃ , P, SiO ₂ , Hg, As, Ba, Cd, Cr, Pb, Hg, Se, Cu, Fe, Zn, Ho, Ni, V, U and Ra-226 D - In Perpetuity	S - 7 F - Same as Laguna Proposal P - Same as Laguna Proposal. D - During reclamation and 3 years thereafter	S - 7 F - Quarterly for GROUP A, Semi-annually for GROUP B P - During reclamation and a minimum of 10 years thereafter	S - 7 F - Quarterly for GROUP C, Annually for GROUP D P - GROUP C: pH, conductivity, TDS, conductivity, HCO ₃ , temperature, HCO ₃ , Cl, Mg, Mn, Na, K, SO ₄ , Fe, NO ₃ , F, Hg, NO ₃ , SiO ₂ , Mn, Fe, U(Natural), Ra-226 GROUP B: Same as GROUP A plus Ag, Al, As, B, Ba, Cd, CN, Pb, Ni, Se, Ba, Cu, F, Hg, Cd, Cr, Cu, F, Hg, Ho, N, Pb, PO ₄ , Se, V, Zn, Ra-226, D - During reclamation and 3 years thereafter	S - 7 F - Quarterly for GROUP A plus Ag, Al, As, B, Ba, Cd, CN, Co, Cr, Cu, F, Hg, Ho, N, Pb, PO ₄ , Se, V, Zn, Ra-226, D - During reclamation and 3 years thereafter	S - 7 F - Quarterly for GROUP A, Semi-annually for GROUP B P - GROUP A: pH, conductivity, TDS, conductivity, HCO ₃ , temperature, HCO ₃ , Cl, Mg, Mn, Na, K, SO ₄ , Fe, NO ₃ , F, Hg, NO ₃ , SiO ₂ , Mn, Fe, U(Natural), Ra-226 GROUP B: Same as GROUP A plus Ag, Al, As, B, Ba, Cd, CN, Pb, Ni, Se, Ba, Cu, F, Hg, Cd, Cr, Cu, F, Hg, Ho, N, Pb, PO ₄ , Se, V, Zn, Ra-226, D - During reclamation and 3 years thereafter
Ground Water/ Quality	S - 3 F - Monthly P - Same parameters as for surface water D - In Perpetuity	S - 17 F - Monthly P - Same as No Action D - During reclamation and 3 years thereafter	S - 17 F - Same as DOI Proposal P - Same as DOI Proposal for GROUP B D - A minimum of 3 years following reclamation	S - 9 F - Quarterly for GROUP E, Annually for GROUP F P - Same as DOI Proposal for GROUP F D - During reclamation and a minimum of 10 years thereafter	S - 17 F - Same as DOI Proposal P - Same as DOI Proposal for GROUP B D - A minimum of 3 years following reclamation	S - 17 F - Quarterly for GROUP E, Annually for GROUP F P - Water levels plus Group A for GROUP E: water level, pH, conductivity, temperature, TDS, SO ₄ , U(Natural), Ra-226 GROUP F: Same as GROUP D identified for surface water plus water level, calcium, Al, As, B, Cr, Cd, Co, Hg, Ho, Ni, PO ₄ , Ag, V D - During reclamation and 3 years thereafter

Table 1-5 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Radiological Particulates	S - 4 F - Monthly P - U(Natural), Ra-226, Po-210, Th-230 D - In Perpetuity	S - 4 F - Monthly P - Same as No Action D - During reclamation and 3 years thereafter	S - 5 F - Monthly P - Same as No Action D - During reclamation and a minimum of 3 years thereafter	S - 6 F - Monthly P - Same as No Action D - 1 Year Minimum	S - 5 F - Quarterly P - Same as No Action D - During reclamation and a minimum of 3 years thereafter	S - 5 F - Monthly P - U(Natural), Ra-226, Po-210, Th-230 D - During reclamation and a minimum of 3 years thereafter
Non-Radiological Particulates	S - 4 F - Monthly P - Total Suspended Particulates (TSP) D - In Perpetuity	S - 4 F - Monthly P - TSP D - During reclamation and 3 years thereafter	S - 5 F - Monthly P - TSP D - During reclamation and a minimum of 3 years thereafter	S - 4 F - Monthly P - TSP D - 1 Year Minimum	S - 5 F - Quarterly P - TSP D - During reclamation and 3 years thereafter	S - 4 F - Monthly P - TSP D - During reclamation and a minimum of 3 years thereafter
Gamma Radiation	S - Each reclaimed waste dump F - Once P - Ground survey of Gamma radiation D - In Perpetuity	S - Each reclaimed F - Once P - Same as No Action D - During reclamation and 3 years thereafter	S - Each waste dump and selected reclaimed areas F - As needed P - Same as No Action D - Prior to soil placement	S - All reclaimed areas F - Once P - Same as No Action D - During reclamation and 3 years thereafter	S - Each reclaimed area F - Once P - Same as No Action D - Before seeding and once after reclamation is completed	S - Each waste dump and selected reclaimed areas F - As needed P - Same as No Action D - During reclamation and 3 years thereafter
Radon Gas	S - 4 F - Monthly P - Ra-222 (pCi/l) D - In Perpetuity	S - 4 F - Monthly P - Ra-222 (pCi/l) D - During reclamation and 3 years thereafter	S - 5 F - Monthly P - Ra-222 (pCi/l) D - A minimum of 3 years following reclamation	S - 4 F - Monthly P - Ra-222 (pCi/l) D - 1 Year Minimum	S - 5 F - Monthly P - Ra-222 (pCi/l) D - During reclamation and 3 years thereafter	S - 5 F - Monthly P - Ra-222 (pCi/l) D - A minimum of 3 years following reclamation
Radionuclide and Heavy Metal Uptake Into Vegetation	S - Each reclaimed waste dump F - Once P - U(Natural), Ra-226, Po-210, Th-230, Se, V, As, Cu, Cd, Mo, Pb, Zn D - In Perpetuity	S - Each reclaimed F - Once P - Same as No Action D - During reclamation and 3 years thereafter	S - Transects on selected reclaimed waste dumps and all pit bottoms F - Annually P - Same as No Action D - A minimum of 10 years following reclamation	S - One grid per 50 acts of reclaimed area F - Once P - Same as No Action D - 1 Year Minimum	S - One grid per reclaimed area F - Once P - Same as No Action D - During reclamation and 3 years thereafter	S - Transects on selected reclaimed waste dumps and all pit bottoms F - Annually P - Same as No Action D - A minimum of 10 years following reclamation

Table 1-5 (Concluded)

Item	No Action Alternative	Green Book Proposal	DOL Proposal (Both Options)	Laguna Proposal	Anconda Proposal	Preferred Alternative
Vegetation Success	S - None F - None P - None D - None	S - Each revegetated area and reference areas F - Annually after third year of reclamation P - Basal cover and production D - Starting the third year after the last seeding or reseeding effort and annually until the success criteria is met.	S - Transects on waste dumps, pit bottoms and off-site reference areas. F - Annually, frequency, density, frequency, basal cover, basal cover and production D - Using the CSA Method, plant establishment would be considered successful when revegetated sites reach 90 percent of the parameter listed above of undisturbed reference areas but not sooner than 10 years following reclamation	S - Survey of staked grids on reclaimed areas (one grid per 50 acres) and comparison plots. F - Annually P - Vegetation types, density, percent cover until sites reach 90 percent of the species density and percent cover of comparison plots D - Starting the third year after the last seeding or reseeding effort and annually until the success criteria is met.	S - Each revegetated area and reference areas F - Annually after third year of reclamation P - Canopy cover and biomass production cover, and production D - Using the CSA Method, plant establishment would be considered successful when revegetated sites reach 90 percent of the parameters listed above of undisturbed reference areas but not sooner than 10 years following reclamation	S - Transects on waste dumps, pit bottoms and off-site reference areas F - Annually P - Density, frequency, basal cover, basal cover and production D - Starting the third year after the last seeding or reseeding effort and annually until the success criteria is met.
Soils	S - One composite sample on each reclaimed waste dump F - Once P - Same as No Action D - During reclamation and 3 years thereafter P - U(Natural), Ra-226, Th-230, As, Se, Mo, Pb, V, Cd, Zn D - In Perpetuity	S - Same as No Action F - Once P - Same as No Action D - During reclamation and 3 years thereafter P - Same as No Action D - In Perpetuity	S - One grid per 50 acres on each waste dump and pit bottom F - Once prior to seeding P - Same as No Action D - 1 Year Minimum plus Pb-210 P - Same as No Action D - Once prior to seeding	S - Grids on reclaimed areas F - Once P - Same as No Action plus Pb-210 D - During reclamation and 3 years thereafter	S - One grid per 50 acres on each waste dump and pit bottom F - Once prior to seeding P - Same as No Action plus Pb-210 D - Once prior to seeding	S - One grid per 50 acres on each waste dump and pit bottom F - Once P - Same as No Action plus Pb-210 D - During reclamation and 3 years thereafter
Meteorology	S - 1 F - continuously P - Wind speed, wind direction D - In Perpetuity	S - 1 F - continuously P - Same as No Action D - During reclamation and 3 years thereafter	Not Proposed	S - 1 F - Same as No Action P - Same as No Action D - A minimum of 3 years following reclamation	S - 1 F - Continuously P - Same as No Action D - During reclamation and 3 years thereafter	S - 1 F - Continuously P - Same as No Action D - During reclamation and 3 years thereafter
Ground Vibration	Not Proposed	Not Proposed	Not Proposed	S - Variable F - Each blast P - Particle Velocity (inches/sec.) and airblast (dB) D - Until all blasting is completed	F - Each blast P - Particle Velocity (inches/sec.) D - Until all blasting is completed	S - Variable F - Particle Velocity (inches/sec.) and airblast (dB) D - Until all blasting is completed

^a/Although a fixed duration and list of parameters is indicated for the preferred Alternative, the monitor program could be modified to take into account parameters that are at baseline levels or show no increasing trends.

TABLE I-6
SUMMARY OF IMPACTS

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Blasting During Reclamation	No blasting proposed.	No blasting specifications proposed to control ground vibration and air blast effects. Possible damage to homes in Pagueate Village.	For both options, DOI has proposed specificiations to control ground vibration and air blast effects. No blast related damage expected.	Specifications proposed for limiting ground movement only. Air blast effects could result in broken windows and other minor damage.	No blasting proposed.	Specifications proposed to control ground vibration and airblast effects. No blast related damage expected.
Mineral Resources	Resources in the P15/17, RJ-45 and P-13 underground areas would remain accessible over the short-term. However, over time the workings would deteriorate making them unsafe and inaccessible. Gavilan Mesa would eventually collapse and bury the protore at its base. All other protore would be placed in the open pits and would not be lost to erosion.	All mine entries would be sealed, making the underground resources inaccessible. Gavilan Mesa would eventually collapse and bury the protore buttersess at its base. All other protore would be enhanced since it would be segregated by grade and the location plotted on maps for future reference.	Impacts would be the same as Green Book Proposal except that recontouring Gavilan Mesa would increase its stability and lessen the chance of it collapsing on the protore.	For mine entries, the impacts would be the same as the Green Book Proposal. No additional buttress material would be placed at the base of Gavilan Mesa. For the short-term, recovery of protore would be enhanced since it would remain in place above ground. Over the long-term, protore would be subjected to erosion and lateral migration of the Rios Pagueate and Moquino.	For mine entries, the impacts would be the same as the Green Book Proposal. No additional buttress material would be placed at the base of Gavilan Mesa. All protore would be buried in the open pits and would not be subjected to erosion or lateral migration of the Rios Pagueate and Moquino.	All mine entries would be sealed making the underground resources inaccessible. No additional buttress material would be placed at the base of Gavilan Mesa. All protore would be buried in the open pits and would not be subjected to erosion or lateral migration of the Rios Pagueate and Moquino.
Highwall Stability	North and South Pagueate pit highwalls would be stable. Sporadic rockfalls would occur. Gavilan Mesa could eventually fail. Lack of fencing on highwall crests would be hazardous.	North and South Pagueate pit highwalls would be stable. Rockfall hazards reduced by scaling. Gavilan Mesa could eventually fail. Lack of fencing on highwall crests would be hazardous.	North and South Pagueate pit highwalls would be stable. Rockfall hazards reduced by scaling and highwall crests sloped 3:1 to prevent piping. Lack of fencing on highwall crests would be hazardous. Fencing of the North and South Pagueate pit highwalls would limit access to the crest. Gavilan Mesa recontoured to increase stability.	North and South Pagueate pit highwalls would be stable. The top 15 feet of all highwalls cut to a 45 degree slope and the soils on highwalls sloped 3:1 to prevent piping and keep people back from edge of highwalls. Rockfall hazards reduced by scaling. Gavilan Mesa could eventually fail. North and South Pagueate pit highwalls fenced to limit access to highwall crests.	Highwall crests would be scaled 10 feet back at 3:1 to prevent piping. No scaling is proposed so the potential of rockfalls could eventually fail. The potential hazard for people falling off the highwalls would be the same as described under the No Action Alternative.	North and South Pagueate pit highwalls would be stable. The top 15 feet of all highwalls cut to a 45 degree slope and the soils on highwalls sloped 3:1 to prevent piping and keep people back from edge of highwalls. All highwalls would be scaled to reduce rockfalls and the North and South Pagueate pit highwalls would be fenced to limit access to the highwall crests. Gavilan Mesa could eventually fail.
Waste Dump Stability	All 32 waste dumps would eventually undergo mass failure, resulting in blocked drainages, alteration of stream courses, increased stream sediment loads and decreased surface water quality.	Based on calculated safety factors, 13 waste dumps would be unstable over the long-term and 12 waste dumps would be marginally to probably stable over the long-term. The remaining dumps would be stable. Mass failure of the dumps that are less than fully stable would result in the same environmental consequences as the No Action Alternative.	FD-2, I and Y2 dumps would be probably stable. All other waste dumps would be stable.	FD-2 would be probably stable. All other waste dumps would be stable.	FD-2 would be probably stable. All other waste dumps would be stable.	FD-2 would be probably stable. All other waste dumps would be stable.
Subsidence	Ground above the P-10 decline could experience sudden and significant subsidence.	The P-10 decline would be backfilled and sealed, eliminating the subsidence hazard.	The P-10 decline would be sealed.	Same as Green Book Proposal.	Same as Green Book Proposal.	The P-10 decline would be backfilled and sealed, eliminating any subsidence hazard.
Underground Openings	Unsealed underground openings would present physical and radiological hazards.	All openings would be sealed and all associated hazards eliminated.	All openings would be sealed and all associated hazards eliminated.	Same as Green Book Proposal.	Same as Green Book Proposal.	All openings would be sealed and all associated hazards eliminated.
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TABLE 1-6 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Post-Reclamation Radiological Impacts	For the period 1982 through 2072, mathematical models predict 15 radiation-induced fatalities for the population within a 50-mile radius of the minesite. Approximately 135,000 natural cancer deaths are predicted for the same time period.	After reclamation, lung cancer deaths would be 10 percent of the No Action Alternative. All other cancer deaths would be reduced to less than 0.1 percent of the No Action Alternative.	Same as Green Book Proposal.	Same as Green Book Proposal.	NOTE: Due to time constraints and complexity of analysis, post-reclamation radiological impacts were not calculated for this plan. However, DOI believes that the minimal soil cover on the protore piles, as specified by the 1985 Plan, would cause the minesite to revert to conditions approaching the No Action Alternative.	The total evaporative losses from the reclaimed pit bottoms and the proposed North Pagueate water storage reservoir would be greater than the perpetual 200 acre-feet per year of the No Action Alternative.
Surface Water Quantity	Perpetual evaporative loss of 200 acre-feet per year from pit bottoms.	The evaporative loss would be the same as the No Action Alternative. One time loss of 3,000 to 4,000 acre-feet of water would saturate the pit backfill.	Evaporative loss would be minimal; one time loss of 3,000 to 4,000 acre-feet of water would saturate the pit backfill.	Same as DOI's Proposal.	Water quality impacts from backfilling the Jackpile and South Pagueate pits would be the same as described in the Green Book Proposal. Water quality in the Rio Pagueate would decrease as a result of inflow from the North Pagueate reservoir. Surface water quality would also be decreased over the long-term due to erosion of nearby protore and mine wastes into the river channels.	Water quality impacts from backfilling the Jackpile and South Pagueate pits would be the same as described in the Green Book Proposal. Water quality in the Rio Pagueate would improve over time.
Surface Water Quality	Water quality in the Rio Pagueate would decrease over time due to erosion of protore piles and waste dumps. Water ponded in the open pits would have elevated levels of virtually all constituents.	All protore would be buried in the pits eliminating impacts to surface water quality. Up to 200 acres of intermittent ponds in the pit bottoms would be saline and unproductive for livestock use. Water quality in the Rio Pagueate downstream would improve over time.	All protore would be buried as in the Green Proposal. For the Monitor Option, any ponded water or saline soils would be eliminated by remedial action. For the Drainage Option, ponds or saline soils would not exist at all. In contrast with the Green Book Proposal, the pit bottoms would be assured of productive use for livestock. Water quality in the Rio Pagueate downstream would improve over time.	Same as DOI's Proposal.	There would be a temporary increase in TDS and heavy metals. Eventually, ground water in the pits would revert to a reducing condition and limit the leaching of the backfill materials. Additional backfill would reduce evapotranspiration from the pit bottoms.	There would be a temporary increase in TDS and heavy metals. Eventually, ground water in the pits would revert to a reducing condition and limit the leaching of the backfill materials. Additional backfill would reduce evapotranspiration from the pit bottoms.
Ground Water Quality	Ground water would double in conductivity as it flowed through mine materials.	There would be a temporary increase in TDS and heavy metals. Eventually, ground water in the pits would revert to a reducing condition and limit the leaching of backfill material.	For both options, the leaching effects would be the same as the Green Book Proposal. However, ground water quality would be better than under Green Book Proposal due to reduced evapotranspiration from the pit bottoms. The Drainage Option would further reduce the likelihood of evapotranspiration from waterlogged soils.	Same as DOI's Monitor Option.	Phreatophytes would be used to transpire ground water inflow to the Jackpile and South Pagueate pits. The phreatophytes would eventually concentrate salts in the upper soil layer and make the pit bottoms uninhabitable for any plant species. Ground water flow into the North Pagueate pit reservoir would mix with the diverted Rio Pagueate and exit via surface flow and seepage.	Recharge and flow would be similar to the natural pattern. Backfill would be added as necessary to control ponded water and saline soil.
Ground Water Recharge and Flow in the Pits	Approximately 50 acres of ponds would exist in the pit areas. Ponds would have elevated levels of salts, radionuclides and minor elements which could have deleterious health effects if ingested by wildlife, livestock or humans.	Ground water would locally converge in the pit bottoms where water would be evaporated and salts retained in the soil. (Backfill levels higher than the Green Book proposed minimum would reduce the impacts of this recharge and flow pattern).	Recharge and flow would be similar to the natural pattern. The DOI Monitor Option would add backfill as needed to control ponding and saline soil. Under the Drainage Option, waters would not pool in pits and surface runoff would be directed to the Rio Pagueate.	Same as Green Book Proposal	Phreatophytes would be used to transpire ground water inflow to the Jackpile and South Pagueate pits. The phreatophytes would eventually concentrate salts in the upper soil layer and make the pit bottoms uninhabitable for any plant species. Ground water flow into the North Pagueate pit reservoir would mix with the diverted Rio Pagueate and exit via surface flow and seepage.	Recharge and flow would be similar to the natural pattern. Backfill would be added as necessary to control ponded water and saline soil.

TABLE 1-6 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Arroyo Headcutting	Headcuts south of I, Y and Y2 dumps would continue to erode, migrate upstream and eventually cut into the dumps. This would increase the sediment load and TDS concentration in the Rio Pagueate. The headcut west of FD-3 dump would move upstream by piping-induced erosion and breach the road and dam.	Armoring of the headcuts south of I, Y and Y2 dumps would initially slow erosion, but eventually the erosion would become ineffective due to silation and bypassing. Erosion would continue with the same impacts as the No Action Alternative.	An improved, no-maintenance armoring system would be used to increase the long-term stability of all headcuts.	Same as DOI's Proposal except the arroyo west of FD-3 would be relocated and not need stabilization.	Same as Green Book Proposal.	An improved, no-maintenance armoring system would be used to increase the long-term stability of all headcuts.
Sedimentation in Pagueate Reservoir	Sedimentation would continue at a rate of about 22 acre-feet per year, but would increase when dump slope failures occur and when headcuts and/or the Rio Moquino cut into dumps.	Reclamation measures would reduce the existing sedimentation rate.	Same as Green Book Proposal.	Same as Green Book Proposal.	Same as Green Book Proposal.	Reclamation measures would reduce the existing sedimentation rate.
Stream Stabilization	The rivers could migrate laterally and remove significant amounts of protore and waste dump material resulting in increased TDS, heavy metals, and possibly radionuclide concentrations in the Rios Pagueate and Moquino. The Rio Moquino road crossing could be breached during high flows.	All waste dumps would be moved back 200 feet from the rivers, providing a buffer against lateral migration and bank caving. The road crossing could still be breached in the No Action Alternative.	The potential for lateral migration and bank caving would be the same as the Green Book Proposal. A permanent cement base or floodproof bridge across the Rio Moquino would stabilize the road crossing and would reduce chances for vertical incision.	Waste dumps along the Rio Moquino would be pulled back 50 feet from the river and the dump toes armored with riprap for protection against lateral migration of the river and the dump toes. Lateral migration of the Rio Pagueate, all contaminated soils would be moved back only 100 feet from the river.	Protore and waste dump material would be moved back only 50 feet from the Rios Pagueate and Moquino. The potential for lateral migration and bank caving would be the same as the Green Book Proposal. A permanent cement base or floodproof bridge across the Rio Moquino would stabilize the road crossing and would reduce chances for vertical incision.	Preferred Alternative Option A: All waste dumps would be moved back 200 feet from the rivers, providing a buffer against lateral migration of the rivers and subsequent bank caving could lead to increased TDS, heavy metal bank caving and thus reducing the water quality impacts described under the No Action Alternative.
Waste Dump Slope Erosion	High erosion rates of 79 tons per acre per year would continue to add waste material acre per year. However, to the rivers resulting in decreased surface water quality.	Mean total erosion would be reduced to 26 tons per acre per year. However, steep slopes would still have a high potential for gully erosion. Runoff chutes would fail and would result in extensive gullying.	For both options, mean total erosion would be 13 tons per acre per year. The 3:1 slopes would reduce the potential for gullying.	Mean total erosion would be reduced to 21 tons per acre per year. Only those slopes at 3:1 would be resistant to gullying. Steeper slopes would have a high potential for gullying.	Mean total erosion would be reduced to 21 tons per acre per year. The slopes would reduce the potential for gullying.	Mean total erosion would be reduced to 21 tons per acre per year. Only those slopes at 3:1 would be resistant to gullying. Steeper slopes would have a high potential for gullying.

TABLE 1-6 (Continued)

Item	No Action Alternative	Green Book Proposal.	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Air Quality	TSP levels could exceed Federal or State standards for short periods. Besides creating an aesthetic problem, the particulates could include radioactive elements from the radioactive piles. This could create a health hazard.	All protore would be buried eliminating any radiological particulate health hazard. TSP levels are expected to be within Federal and State standards.	Same as Green Book Proposal.	Same as Green Book Proposal.	The soil cover on protore piles would eliminate the radiological particulate hazard in the short-term. Over the long-term, this soil cover could erode and expose radiological materials. TSP level are expected to be within Federal and State standards.	All protore would be buried eliminating any radiological particulate health hazard. TSP levels are expected to be within Federal and State standards.
Soils	Erosion rates would be high and plant densities low. No topsoil borrow areas would be needed.	Redistribution of soils and reclamation of the minesite would decrease erosion rates and increase vegetative cover. A 4-acre topsoil borrow area may be needed. Up to 200 acres of pit bottoms abandoned from productive use due to salt build-up.	Same as Green Book Proposal except the greater soil depths would require additional borrow areas. The deeper soil cover (18"-24") would also reduce the possibility of upward migration of salts. Intermixing soils with backfill materials during surface preparation. Backfill would be added as required.	Since the top layer of pit backfill would be Mancos Shale, there is a possibility of temporary saturation of the topsoil - shale cover. The deeper soil cover (18"-24") would also interface resulting in upward migration of salts. These salts would inhibit plant growth. Three topsoil borrow areas would be necessary to prevent ponding and salt build-up.	Same as Green Book Proposal that up to 160-170 acres of pit bottoms abandoned from productive use due to salt build-up.	Redistribution of soils and reclamation of the minesite would decrease erosion and increase vegetative cover. Several borrow areas may be necessary to accommodate soils depths of 18"-24". The deeper soil cover would reduce the possibility of intermixing soil with backfill materials during surface preparation. Backfill would be added as necessary to prevent ponding and salt build-up.
Flora	Mesmer and scattered vegetative re-establishment would continue by secondary succession on habitable sites. Many disturbed areas would remain permanently barren and unprotected from erosion.	Revegetated sites with only 70 percent of the basal cover and production of less than native reference areas would be less productive than natural sites, and unprotected from erosion.	Revegetated sites with only 70 percent of the basal cover and production of less than native reference areas would be less productive than natural sites, and unprotected from erosion processes.	Vegetative parameters of density, basal, and foliar cover, diversity and production on reclaims sites would be at least 90 percent of that found on reference areas.	Vegetative parameters of density and cover of plant communities would ensure that plant communities are viable and self-sustaining over the long-term.	Gentler (3:1) slopes with contour furrows would significantly enhance the opportunities for plant community establishment. Vegetative parameters of density, basal and foliar cover, diversity and production on reclaimed sites would be at least 90 percent of that found on reference areas. A 10-year monitoring period would be necessary to monitor natural fluctuations in plant growth, ensure that the revegetative success criteria is met and to be certain that the resulting plant communities be self-sustaining over the long-term.

TABLE 1-6 (Continued)

Item	No Action Alternative	Green Book Proposal	DOI Proposal (Both Options)	Laguna Proposal	Anaconda Proposal	Preferred Alternative
Fauna	Wildlife habitat would be poor and wildlife populations would be low.	Habitat improvements would lead to an increase in wildlife populations.	A greater improvement in habitat would result from the improved re-vegetation. A corresponding increase in wildlife populations would result.	Same as DOI's Proposal.	Impacts would be similar to Green Book Proposal. Additionally, the 30-40 acre water storage reservoir in North Pagueat pit would initially attract waterfowl and provide for fish habitat. However, over the long-term, water quality in the reservoir would decline, making it unfit for wildlife and fish.	Improved wildlife habitat compared to the No Action Alternative with corresponding increase in wildlife populations.
Cultural Resources	No Impact. Anaconda would continue to control access.	The disturbance of additional archaeological sites is not anticipated. Areas of religious concern would be avoided during reclamation efforts. Upon completion of reclamation, access to archaeological sites and religious areas would be less controlled allowing more vandalism as well as easier access for religious purposes.	Same as Green Book Proposal.	Same as Green Book Proposal.	Same as Green Book Proposal.	The disturbance of additional archaeological sites is not anticipated. Areas of religious concern would be avoided during reclamation efforts. Upon completion of reclamation, access to archaeological sites and religious areas would be less controlled allowing more vandalism as well as easier access for religious purposes.
Visual Resources	Visual resource quality would remain poor.	Visual resource quality would be enhanced by reclamation.	Higher revegetation success criteria would enhance visual resource quality compared to the Green Book Proposal.	Same as DOI Proposal.	Visual impacts would be similar to Green Book Proposal. The North Pagueat pit water reservoir would be an introduced landscape feature that would attract attention.	Higher revegetation success criteria would enhance visual resource quality compared to the other proposals.
Socioeconomic Conditions	Unemployment levels at the Pueblo of Laguna would remain high and associated social problems would persist.	Reclamation would provide temporary employment and income. However, as reclamation progresses and the work force is reduced, unemployment would resume and associated social problems would reappear.	Same as Green Book Proposal.	Same as Green Book Proposal.	Same as Green Book Proposal.	Reclamation would provide temporary employment and income. However, as reclamation progresses and the work force is reduced, unemployment would resume and associated social problems would reappear.
Irreversible and Irretrievable Commitment of Resources	A perpetual evaporative loss of 200 acre-feet per year of surface water.	The evaporative loss would be the same as the No Action Alternative. A one-time loss of 3,000 to 4,000 acre-feet of water would resaturate pit backfill. Energy usage for the Monitor Option would be 290,000 kilowatt hours and 5.3 million gallons of fuel; for the Drainage Option 290,000 kilowatt hours and 5.5 million gallons of fuel. Reclamation would require 201 man-years of labor.	One-time loss of 3,000 to 4,000 acre-feet of water would resaturate pit backfill. Energy usage for the Monitor Option would be 292,000 kilowatt hours and 5.7 million gallons of fuel. Reclamation would require 293,000 kilowatt hours and 2.1 million gallons of fuel. Reclamation would require 77 man-years of labor.	One-time loss of 3,000 to 4,000 acre-feet of water the reclaims pit bottoms and the North Pagueat pit reservoir would be greater than the 200 acre-feet per year of the No Action Alternative. Energy usage would be 292,000 kilowatt hours and 5.3 million gallons of fuel; for the Drainage Option 290,000 kilowatt hours and 5.5 million gallons of fuel. Reclamation would require 198 man-years of labor.	One-time loss of 3,000 to 4,000 acre-feet of water would resaturate pit backfill. Energy usage would be 292,000 kilowatt hours and 5.7 million gallons of fuel. Reclamation would require 293,000 kilowatt hours and 2.1 million gallons of fuel. Reclamation would require 77 man-years of labor.	One-time loss of 3,000 to 4,000 acre-feet of water would resaturate pit backfill. Energy usage would range from 3,7 to 5.3 million gallons of fuel. Reclamation would require 137 to 198 man-years of labor.
Total Non-Radiological (Equipment use) Accidents During Reclamation	0	29.8 (Monitor Option) 30.5 (Drainage Option)	20.2	20.6 (Monitor Option) 20.6 (Drainage Option)	11.6	20.6 to 29.8